CLAIMS

[1] A motor control apparatus comprising:

a position detecting portion for detecting a position of a motor for driving a mechanism a moment of inertia or an inertia mass of which is unknown,

a speed calculating portion for outputting a speed of the motor by inputting an output of the position detecting portion,

a position control portion for outputting a speed reference by inputting a difference between a position reference and the position of the motor,

an inertia variation restraining portion for outputting a new torque reference by predicting a disturbance of the motor by inputting a torque reference and the speed of the motor,

a torque control portion for controlling a torque of the motor by inputting the new torque reference,

a phase compensating portion for outputting a new speed reference of advancing a phase by inputting the speed reference, and

a speed control portion for outputting the torque reference by inputting a difference between the new speed reference and the speed of the motor.

[2] The motor control apparatus according to claim 1, further

comprising:

a phase compensating portion for outputting a new speed of advancing the phase by inputting the speed of the motor and the torque reference in place of the phase compensating portion, and

a speed control portion for outputting the torque reference by inputting a difference between the speed reference and the new speed in place of the speed control portion.

[3] The motor control apparatus according to claim 1, further comprising:

a first phase compensating portion for outputting a new speed reference of advancing the phase by inputting the speed reference in place of the phase compensating portion,

a second phase compensating portion for outputting a new speed advancing the phase by inputting the speed of the motor and the torque reference, and

a speed control portion for outputting the torque reference by inputting a difference between the new speed reference and the new speed in place of the speed control portion.

[4] The motor control apparatus according to claim 2, wherein the phase compensating portion comprises a low pass filter and calculates a time constant of the low pass filter by a polynomial constituting an independent variable by a speed loop gain.

[5] The motor control apparatus according to claim 3, wherein the second phase compensating portion comprises a low pass filter and calculates a time constant of the low pass filter by a polynomial constituting an independent variable by a speed loop gain.

[6] The motor control apparatus according to claim 1, wherein the phase compensating portion comprises a low pass filter and calculates a cut off frequency of the low pass filter by a polynomial constituting an independent variable by a speed loop gain.

[7] The motor control apparatus according to claim 3, wherein the first phase compensating portion comprises a low pass filter and calculates a cut off frequency of the low pass filter by a polynomial constituting an independent variable by a speed loop gain.

[8] A motor control apparatus comprising:

a position detecting portion for detecting a position of a motor for driving a mechanism a moment of inertia or an inertia mass of which is unknown,

a speed calculating portion for outputting a speed of the motor by inputting an output of the position detecting portion,

an inertia variation restraining portion for outputting a new torque reference by predicting a disturbance of the motor by inputting a torque reference and the speed of the motor,

a torque control portion for controlling a torque of the motor by inputting the new torque reference,

a phase compensating portion for outputting a new speed advancing a phase by inputting the speed of the motor and the torque reference, and

a speed control portion for inputting the torque reference by inputting a difference between a speed reference and the new speed.

[9] The motor control apparatus according to claim 8, wherein

the phase compensating portion comprises a low pass filter and calculates a time constant of the low pass filter by a polynomial constituting an independent variable by a speed loop gain.

[10] A motor control apparatus comprising:

a position detecting portion for detecting a position of a motor for driving a mechanism a moment of inertia or an inertia mass of which is unknown,

a speed calculating portion for outputting a speed of the motor by inputting an output of the position detecting portion,

a position control portion for outputting a speed reference by inputting a difference between a position reference and the position of the motor,

a speed feed forward portion for outputting a speed feed forward signal by inputting the position reference,

an inertia variation restraining portion for outputting a new torque reference by predicting a disturbance of the motor by inputting a torque reference and the speed of the motor,

a torque control portion for controlling a torque of the motor by inputting the new torque reference,

a phase compensating portion for outputting a new speed reference advancing a phase by inputting a sum of the speed reference and the speed feed forward signal, and

a speed control portion for outputting the torque reference by inputting a difference between the new speed reference and the speed of the motor.

[11] The motor control apparatus according to claim 10,

further comprising:

a phase compensating portion for outputting a new speed advancing the phase by inputting the speed of the motor and the torque reference in place of the phase compensating portion, and

a speed control portion for outputting the torque reference by inputting a difference between the sum of the speed reference and the speed feed forward signal and the new speed in place of the speed control portion.

[12] The motor control apparatus according to claim 10, further comprising:

a first phase compensating portion for outputting the new speed reference advancing the phase by inputting the sum of the speed signal and the speed feed forward signal in place of the phase compensating portion,

a second phase compensating portion for outputting the new speed advancing the phase by inputting the speed of the motor and the torque reference, and

a speed control portion for outputting the torque reference by inputting a difference between the new speed reference and the new speed in place of the speed control portion.

[13] A motor control apparatus comprising:

a position detecting portion for detecting a position of a motor for driving a mechanism a moment of inertia or an inertia mass of which is unknown,

a speed calculating portion for outputting a speed of the motor by inputting an output of the position detecting portion,

a position control portion for outputting a speed reference by inputting a difference between a position reference and the position of the motor,

a speed feed forward portion for outputting a speed forward signal by inputting the position reference,

a torque feed forward portion for outputting a torque feed forward signal by inputting the position reference,

an inertia variation restraining portion for outputting a new torque reference by predicting a disturbance of the motor by inputting a sum of a torque reference and the torque feed forward signal and the speed of the motor,

a torque control portion for controlling a torque of the motor by inputting a new torque reference,

a phase compensating portion for outputting a new speed reference advancing a phase by inputting a sum of the speed reference and the speed forward signal, and

a speed control portion for outputting the torque reference by inputting a difference between the new speed reference and the speed of the motor.

[14] The motor control apparatus according to claim 13, further comprising:

a phase compensating portion for outputting a new speed advancing the phase by inputting a sum of the torque reference and the torque feed forward signal and the speed of the motor in place of the phase compensating portion, and

a speed control portion for outputting the torque reference by inputting a difference between a sum of the speed reference and the feed forward signal and the new speed in place of the speed control portion.

[15] The motor control apparatus according to claim 13, further comprising:

a first phase compensating portion for outputting the new speed reference advancing the phase by inputting the sum of the speed reference and the speed feed forward signal in place of the phase compensating portion,

a second phase compensating portion for outputting a new speed advancing the phase by inputting a sum of the torque reference and the torque feed forward signal and the speed of the motor, and

a speed control portion for outputting the torque reference by inputting a difference between the new speed reference and the new speed in place of the speed control

portion.

[16] The motor control apparatus according to claim 10 or 13, wherein

the phase compensating portion comprises a low pass filter and calculates a cut off frequency of the low pass filter by a polynomial constituting an independent variable by a speed loop gain.

[17] The motor control apparatus according to claim 11 or 14, wherein

the phase compensating portion comprises a low pass filter and calculates a time constant of the low pass filter by a polynomial constituting an independent variable by a speed loop gain.

[18] The motor control apparatus according to claim 12 or 15, wherein

the first phase compensating portion comprises a low pass filter and calculates a cut off frequency of the low pass filter by a polynomial constituting an independent variable by a speed loop gain.

[19] The motor control apparatus according to claim 12 or 15, wherein

the second phase compensating portion includes a low pass filter and calculates a time constant of the low pass filter by a polynomial constituting an independent variable by a speed loop gain.